

M.Sc. ANALYTICAL CHEMISTRY
Examination November - 2025

Day & Date	Semester	Subject Name	Time	Code	Marks
Wednesday 26/11/2025	IV	Analytical Chemistry Paper IV	2.00 p.m. To 04.00 p.m.	415211	50

INSTRUCTION: All Questions Are Compulsory

Draw Neat Labelled Diagram

Q.1) Attempt any Five of the following (10)

1. Define X-ray diffraction.
2. What are nanoparticles? Give one example?
3. List two essential components of a TG instrument?
4. What are radioactive decay products? Give one example?
5. What is Neutron Activation Analysis (NAA)?
6. What is the Mossbauer effect?
7. What type of electrons are detected in AE?

Q.2) Attempt any two of the following (10)

1. Describe the basic instrumentation used in neutron diffraction experiments.
2. With the help of a schematic diagram, explain the basic instrumentation of an X-ray diffraction.
3. Briefly discuss all types of dimensions of nanomaterials?

Q.3) Attempt any two of the following (10)

1. Describe the principle and instrumentation of Differential Thermal Analysis (DTA). How is it used to study thermal transitions?
2. Describe the different types of radioactive decay processes?
3. Discuss the advantages and limitations of Neutron Activation Analysis. Highlight two significant applications of this technique?

Q.4) Attempt any two of the following (10)

1. Describe the basic instrumentation of a Mossbauer spectrometer, including the key components and their functions?
2. Explain the Auger electron emission process. How does the energy of Auger electrons provide information about the elemental composition of a sample's surface?
3. Explain the principle of Scanning Electron Microscopy. How is an image of the sample's surface generated?

Q.5) Attempt any two of the following (10)

1. Explain the 12 principle and concept of Green Chemistry. How does it contribute to sustainable development?
2. Explain the principles and applications of microwave-assisted synthesis in Green Chemistry. Highlight its benefits over conventional heating methods?
3. What is photochemical reaction? Mention one advantage of using photochemical reactions in synthesis?

Master of Science in Analytical Chemistry

Examination: April 2026

Day & Date	Semester	Subject Name	Time	Code	Max. Marks
Monday 27/04/2026	IV	Advance Environmental Science	11.00 a.m. to 02.00 p.m.	425211	50

INSTRUCATION – ALL QUESTION ARE COMPULSORY

Q. 1 Attempt any five of the following (10)

1. List three agro – climatic zones of India ?
2. Define sustainable development ?
3. Why do landfills need bottom liners ?
4. What is a bioreactor ?
5. Define bioenergy and examples of biomass sources ?
6. How does energy consumption affects air pollution ?
7. Name two environmental NGO that work for river conservation in India ?

Q. 2 Attempt any two of the following (10)

1. Explain the definition , principle, and scope of environmental science. How has this field evolved over time to address current environmental challenges ?
2. Explain the hydrosphere and its importance to life on Earth. How do human activities affect the global water cycle ?
3. Explain the concept of sustainable development goals ?

Q. 3 Attempt any two of the following (10)

1. Describe the working of a pressurized water reactor (PWR) with a neat diagrams ?
2. Explain positive and negative Environmental implications of Bioenergy uses with Example?
3. Discuss the social and environmental challenges of transitioning to large – scale renewable energy use ?

Q. 4 Attempt any two of the following (10)

1. Describe the 4 main steps of biogas production. How can different organic wastes be mixed for better production ?
2. How do modern landfills collect methane gas ? Draw a simple diagram of a landfill gas collection system.
3. What makes industrial plant design sustainable and construction of industry explain with the help of example ?

Q. 5 Attempt any two of the following

(10)

1. Explain the impact of urbanization on air quality and suggest measures for improvement ?
 2. Discuss the importance of public participation in environmental movements with case studies ?
 3. What are the major water conservation techniques adopted in Indian village ?
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Master of Science in Analytical Chemistry
Examination: November -2025

Day & Date	Semester	Subject Name	Time	Code	Max. Marks
Friday 28/11/2025	IV	Advance environment Science	02:00 PM To 04:00 PM	425211	50

Instructions:

All Questions are compulsory

Q.1 Attempt any Five of the following 10

1. What is environmental science?
2. List three main principles of environmental science?
3. What is anaerobic digestion?
4. Define nuclear fission and nuclear fusion?
5. What makes up most biogas?
6. List two anaerobic digester types?
7. Define environmental planning and its objectives?
8. What was the main objective of the Delhi Odd-Even scheme?

Q.2 Attempt any two of the following 10

1. Describe the structure and composition of the Earth's atmosphere.
How do different atmospheric layers protect life on Earth?
2. Describe the biosphere as an interconnected system. How do energy and nutrients flow through the biosphere?
3. Discuss the major agro-climatic zones of India. How do these zones influence agriculture and food production across the country along with challenges With neat labelled diagrams?

Q.3 Attempt any two of the following 10

1. Explain the principle of nuclear fission and fusion with a suitable example?
2. Explain the different methods of bio energy production?
3. Discuss the environmental impacts of large-scale solar energy projects?

Q.4 Attempt any two of the following 10

1. How are genetically modified microbes prepared and their application?
2. Explain growth patterns of different water weed types with diagrams and examples?
3. Explain landfill leachate and gas collection systems?

Q.5 Attempt any two of the following 10

1. What are the Major policies and regulations in India to control vehicular pollution?
2. Describe the importance of environmental education in promoting sustainable practices?
3. Write a case study on Almatti Dam Water Dispute?

End of Paper